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PSYCHOMOTOR RESPONSES OF DENTISTS USING NITROUS OXIDE - OXYGEN --ETC(U)  
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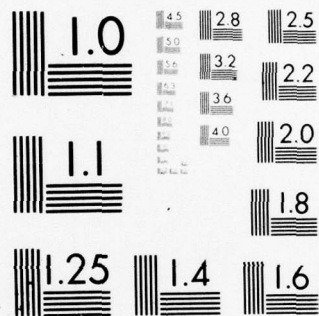
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(6) PSYCHOMOTOR RESPONSES OF DENTISTS  
USING NITROUS OXIDE - OXYGEN  
PSYCHOSEDATION

(10) William A. Ayer, DDS, PhD\*  
E. A. Russell, Jr., DDS, MSD\*\*  
J. R. Burge, MS\*\*\*

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U. S. Army Institute of Dental Research  
Walter Reed Army Medical Center  
Washington, D. C. 20012

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\*LTC, DC, Chief, Advanced Theory and Science of Dental Practice

\*\*COL, DC, Chief, Oral-Maxillofacial Surgery

\*\*\*Statistician, Department of Biostatistics and Applied Mathematics,  
Walter Reed Army Medical Center

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The psychomotor effects of nitrous-oxide oxygen psychosedation has been studied in medical student volunteers not undergoing any kind of treatment by Trieger and his colleagues (Trieger, Laskota, Jacobs, and Newman, 1971) and in dental patients both children and adults (Ayer and Getter, 1974; and Machen, Ayer and Mueller, 1977). These studies have utilized nitrous oxide in concentrations of 25 to 35%, and have concluded that psychomotor impairments, as measured by the tests, were minimal at those concentrations and were rapidly reversed following a 3-5 minute post-treatment oxygenation period.

Recent attention has been directed at the effects of nitrous oxide on the dentist who may be exposed to waste gases for a prolonged period of time. However, little evidence is available which demonstrates conclusively that the dentist is adversely affected by transient or prolonged nitrous oxide exposure in the course of patient treatment.

Because of the absence of any data on potential impairments of the psychomotor abilities of dentists who utilize nitrous oxide, the present study investigated the psychomotor responses of dentists during the course of a treatment period in which nitrous oxide was administered to a patient.

#### Materials and Methods

Two groups of ten(10) dentists each comprised the study samples. Group 1 constituted the experimental group which involved treating patients with nitrous-oxide oxygen psychosedation. Group 2 was a control group of 10 dentists in an advanced degree program who were not exposed to nitrous oxide.

Group 1 administered nitrous oxide to patients in an average concentration of 35% nitrous oxide for routine restorative procedures. The dentists

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in the experimental group were tested with psychomotor test prior to beginning treatment, 20 minutes after treatment started, and again at the conclusion of treatment.

Subjects in Group 2 were tested at similar time intervals. Also the waste gas concentration in parts per million (ppm) was monitored using the Moran nitrous oxide analyzer to determine the mean concentrations in the ambient air throughout the restorative procedure.

The psychomotor tests utilized in the present study included the Lafayette Peg Board test and the Ruesch Color Naming Test. Both tests were selected because of the ease of administration and the fact that scores based on the time required to complete the test can be obtained and used as a measure of impairment.

#### RESULTS:

The average concentration of nitrous oxide in the ambient air during the course of patient treatment was 536.2 ppm although it ranged from 150 ppm to 1500 ppm.

The data from the pegboard test were tabulated and are shown in Figure 1. The data were subjected to a mixed analysis of variance using repeated measures. The results of the analysis was an  $F$ -value of less than one which was not significant, thus indicating there were no differences between the experimental and control groups in psychomotor ability as measured by the pegboard test. The results of the analysis are summarized in Table 1.

The data for the color naming test were tabulated and are depicted in Figure 1. The data were again subjected to a mixed analysis yielding a non-significant  $F$ -value thus indicating that there were no differences in psychomotor abilities between the two groups. The results of the analysis



are further summarized in Table 2.

#### DISCUSSION

The findings for dentists <sup>this</sup> reported in the present study are essentially similar to those reported <sup>previously</sup> in previous studies on the effects of nitrous oxide on psychomotor activities during and following dental treatment. One reason for the similarity may be the fact that all of these studies have involved investigation of psychomotor abilities during one treatment session. The effects of prolonged exposure to nitrous oxide requires additional study to clarify those effects if, in fact, there are any. Another reason may be that the waste nitrous oxide gas available in the operatory was insufficient in the present study to actually result in any observable effects. However, since the activity of nitrous oxide is time and concentration dependent, prolonged exposure could conceivably result in psychomotor impairments for those clinicians who utilize this modality of psychosedation for prolonged periods of time. As noted above, however, this remains to be demonstrated.

#### REFERENCES

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- Ayer, W.A. and Getter, L. Psychomotor responses to nitrous oxide-oxygen sedation during dental treatment. Anesth. Prog., 21:7173, 1974.
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TABLE 1

Summary Table of Analysis of Variance for Peg Board Test

| <u>Source</u> | <u>df</u>       | <u>SS</u>      | <u>MS</u> | <u>F</u> | <u>P</u> |
|---------------|-----------------|----------------|-----------|----------|----------|
| subject       | 9               | 510.354        | 56.706    |          |          |
| group         | 1               | 37.604         | 37.604    | .8325    | N.S      |
| GxS           | 9               | 884.853        | 98.317    |          |          |
| Trials        | 2               | 419.72         | 209.86    | 21.6498  | .01      |
| GxT           | 2               | 20.308         | 10.154    | 1.0475   |          |
| Error         | <u>36</u><br>59 | <u>348.966</u> | 9.693     |          |          |



TABLE 2

## Summary Table of Analysis of Variance for Color Naming Test

| <u>Source</u> | <u>df</u>              | <u>SS</u> | <u>MS</u> | <u>F</u> | <u>P</u> |
|---------------|------------------------|-----------|-----------|----------|----------|
| subject       | 9                      | 393.75    | 43.75     |          |          |
| group         | 1                      | 9.204     | 9.204     | .3280    | N.S      |
| GxS           | 9                      | 252.585   | 28.065    |          |          |
| Trials        | 2                      | 38.434    | 19.217    | 6.6117   | .01      |
| GxT           | 2                      | 7.433     | 3.716     | 1.2788   |          |
| Error         | <u>36</u><br><u>59</u> | 104.634   | 2.906     |          |          |

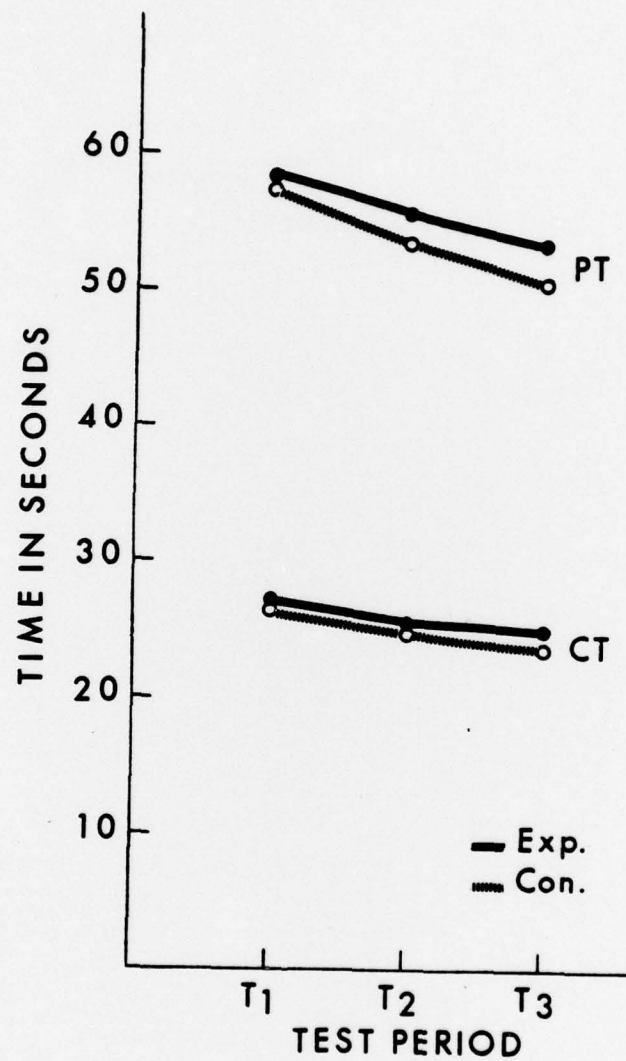


FIGURE 1. Means for each group (in seconds) for color test (CT) and peg test (PT) for each testing period.